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# Effectiveness of PEMF on Pain and quality of life in the patients with Knee Osteoarthritis- A literature review

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## Abstract:

**Background:** In the patients with Osteoarthritis, PEMF is most commonly used even though there is not any proof to show its effect PEMF when used increase the quality of life as well as decrease the intensity of pain and inflammation.

**Objective-**To examine the sequel of PEMF on pain and QoL in the osteoarthritis patients.

**Data source-** Two data bases (PubMed , Google Scholar) from 2010- 2020

**Review methods-** Studies on the end effect of PEMF on Pain, functions, ADL and QOL were included in the study.

**Results-** 30 articles were extracted out of which 6 were included in the study which emphasizes the effectiveness of PEMF on pain and functional activities .Studies show positive effect on the patients with knee osteoarthritis.

**Conclusion-** Even though there are positive effects of PEMF, there are lack of quality studies that prove the significant role of PEMF in the patients of knee osteoarthritis.

**Keywords-** Knee, osteoarthritis, PEMF, Pain, quality of life.

## **Introduction and background**

Osteoarthritis is one of the most frequent disease, approximated that affects 1 in the 8 adults and is a crucial cause of chronic pain(1).It is a degenerative joint arthirits which, biomechanical stress affects both articular cartilage and subchondral bone, resulting in a shared joint includes articular cartilage, inflammation of synovium , debasement of ligament and menisci and joint capsule hypertrophy(1). Knee OA affects 16 percent of adults over 15 years old in the world, and 40 percent of people over 40 years old. is higher than 22.9% and the incidence is 203 per 10000 of females above 20years of age(3). Pain pattern and severity of OA knee affects the ROM, Quality of life depending on the pain severity either as absent, mild, moderate, severe or very severe (2).Since past 30years PEMF is being used to treat bone and joint diseases (4) PEMF has proved to have useful outcomes in treating the patients with various clutter including recent fractures , delayed and malunion of fractures as compared to the drug therapy (1).It is also prove to retard the growth of OA by inducing the synthesis of proteoglycan which had positive effect on the proliferation of the cells and DNA through the opening of voltage sensitive calcium channels (4). Electromagnetic field is used by PEMF to create short electric fields in the tissues which promote healing and relieve pain and inflammation(5).PEMF is an emerging modality to treat the wide range of musculoskeletal disorders(3).PEMF utilizes the lower end frequencies of ranging from 6 to 500 Hz that are capable of stimulating biological current that produce biological effects that are used for treating skeletal diseases(1). As PEMF is the

## **DISCUSSION**

Total 30 articles were found out of which 6 were included in the study based on the inclusion and exclusion criteria. A summary is projected below

Study done in the year 2010 to evaluate the secondary effect of PEMF on the physical treatment of knee osteoarthritis which included

disease. major cause of morbidity, functional limitation especially in elderly patients (2).OA manifests clinically in the form of pain deformity, instability or functional impairment of the affected joints which typically localizes knee, hip, hand, lumbar as well as cervical joints(3).Pathogenesis of OA is unclear which

emerging modality there are many evidences that are available and some of the evidences are yet to be published, therefore this study aims to access the evidences connected to the effects of PEMF.

## **METHODOLOGY**

The review paper is primarily composed of PubMed, and google scholar database used to search for the publication using the regular keywords that are aimed to focus on Osteoarthritis, physiotherapy and rehabilitation, quality of life. There were various systemic reviews, meta-analysis, review articles were found through the search. The references of these articles are used to conduct the other research publications.

The review articles chosen were based on the following criteria-English language publication, articles published within last 10 years, human subjects and observational research on the other hand the articles which were rejected were in the other languages not in English, and had been published more than 10 years and were meta-analyses and case series.

Osteoarthritis , use of pemf , effects of pemf on osteoarthritis, physiotherapy in osteoarthritis . 30 articles were related to PEMF preliminarily 6 articles were found appropriate according to the inclusion criteria

patients from 45-75 years of age who were diagnosed with grade 2 osteoarthritis and has radiological alterations according to the Kellegran –Lawrence criteria and more and pain intersity 40 and more. They were randomized, controlled and blinded and were recruited from the outpatient department and were assigned to the treatment according to therandomization.Each session included a 20minu

te heat pack, 5minute therapeutic ultrasound, and 30minute PEMF on each patient's knee. As a superficial heating agent, Hydrocollator 53x33cm hot packs were submerged in tanks at 70°C and put over three or four layers of insulating towels while patients sat with theirknees extended., while in another group the device's intensity was close to zero. One physiotherapist taught terminal isometric knee exercise to all patients at the start of treatment. Patients were seated at a table with a 10-cm diameter wrapped towel or wooden cylinder placed beneath their knees.

A onekilogram weight was placed on the patients' ankles, and they were instructed to extend their knee for 5 seconds before relaxing. The patients did 30 repetitions of this exercise routine three times a day. Both the treatments were administered for 2 weeks and came to the conclusion found adding PEMF to traditional superficial and deep heating did not result in a statistically meaningful improvement in pain, stiffness, or impairment in patients with knee OA.

More research with longterm followup is needed to verify that PEMF therapy is effective in lowering symptoms when compared to placebo therapy.

Study done in the year 2012 to determine if PEMF can modulate signaling of CaM/NO/cGMP to reduce pain in early knee OA which included the patient having knee pain since 3months which is confirmed by imaging and had the Initial VAS score of 4 and daily standing activity of 2 hours. The PEMF signal was made up of a 7 msec burst of 6.8 MHz sinusoidal waves that were repeated at 1 burst/sec, resulting in a peak induced electric current of 8 V/m in the knee. The battery-operated, light-weight device was utilised for 15 minutes twice day. and came to the conclusion that the When designed to dose CaM/NO/cGMP signalling, non-thermal, noninvasive PEMF has a large and immediate impact on pain from early knee OA. The painrelieving impact of PEMFs is consistent with the known fast effusionreduction effect of NO signalling. The nonpharmacological intervention is new because

the patient population did not have endstage OA and was needed to be on their feet for at least two hours each day.

Study done in the year 2013 to Examine the clinical efficacy of a PEMF device in the treatment of elderly individuals with knee osteoarthritis. A total of 33 patients were screened, with 28 of them having bilateral knee OA and being between the ages of 60 and 83. were included in this study having the pain for at least 1 year prior to the treatment and were assessed on VAS. The patients underwent 2 regimens during which right leg was treated with PEMF and left leg did not receive any of the therapy which was used as control and came to the conclusion PEMF therapy reduces knee related pain, stiffness, and physical function in elderly patients with knee OA, according to a study. More research is needed to determine the effectiveness of PEMF therapy over time and to understand its mechanism.

Study done in the year 2015 to evaluate the effects of PEMF which is double blind study patients with knee osteoarthritis during which they were randomized according to the envelope picked by the patient from the container during which the 13 patients were assigned for the placebo group and was treated with PEMF and the other electrical device and came to the conclusion that the use of PEMF of sufficient strength (105 mT) leads to highly significant better results in the treatment group compared to the placebo group with regard to the total WOMAC global score and especially for VAS.

The study done in 2015 to see if a wearable PEMF device could help patients with knee OA manage their pain. during which patient were randomized and selected according to the presence of primary osteoarthritis and age of the patients should be more than 40 years and were randomly allocated into 2 group PEMF group and placebo group and the treatment was administered for 4 weeks that is for 1 month and came to the conclusion that. In comparison to earlier studies, PEMF therapy in knee OA can be considered an

alternative safe and effective therapy in knee OA, allowing for home-based pain management.

A study done by Alberto Gobbi in the year 2013 to evaluate the effectiveness of PEMF on early OA during which the patients recruited were from the age of 30- 60 years with early osteoarthritis and radiographic finding of grade 3-4 as per Kellgren-Lawrence classification, of 26 patients 13 were excluded from the study and was given PEMF which included 4 hour treatment and for 45 days and found that In a group of patients with symptomatic early osteoarthritis of the knee, using pulsed electromagnetic fields as a conservative treatment resulted in significant improvements in symptoms, pain, knee function, and activity level at 1-year follow-up, but not at 2-year follow-up. It is a viable option to existing conservative treatments, with the added benefit of being relatively free of side effects and patient acceptance. Repetition of the treatment on a yearly basis may result in long-term symptom relief for the patella.

#### CONCLUSION-

There were significant results of PEMF on pain, functional activities and QoL on the patient with early OA as well as the patients with chronic OA.

#### LIMITATIONS-

The authors acknowledge as the publication bias as less number of articles are included. No meta analysis and systematic reviews were included in the study keeping in mind the heterogeneity of population.

#### FUTURE RECOMMENDATIONS-

High quality RCT's should be performed to explore effects of PEMF.

CONTRIBUTING DETAILS- Medhavi Jagzape and Deepali Patil framed the idea, data extraction and manuscript.

CONFLICTS OF INTEREST- None

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